

Science

Science

Earth Science

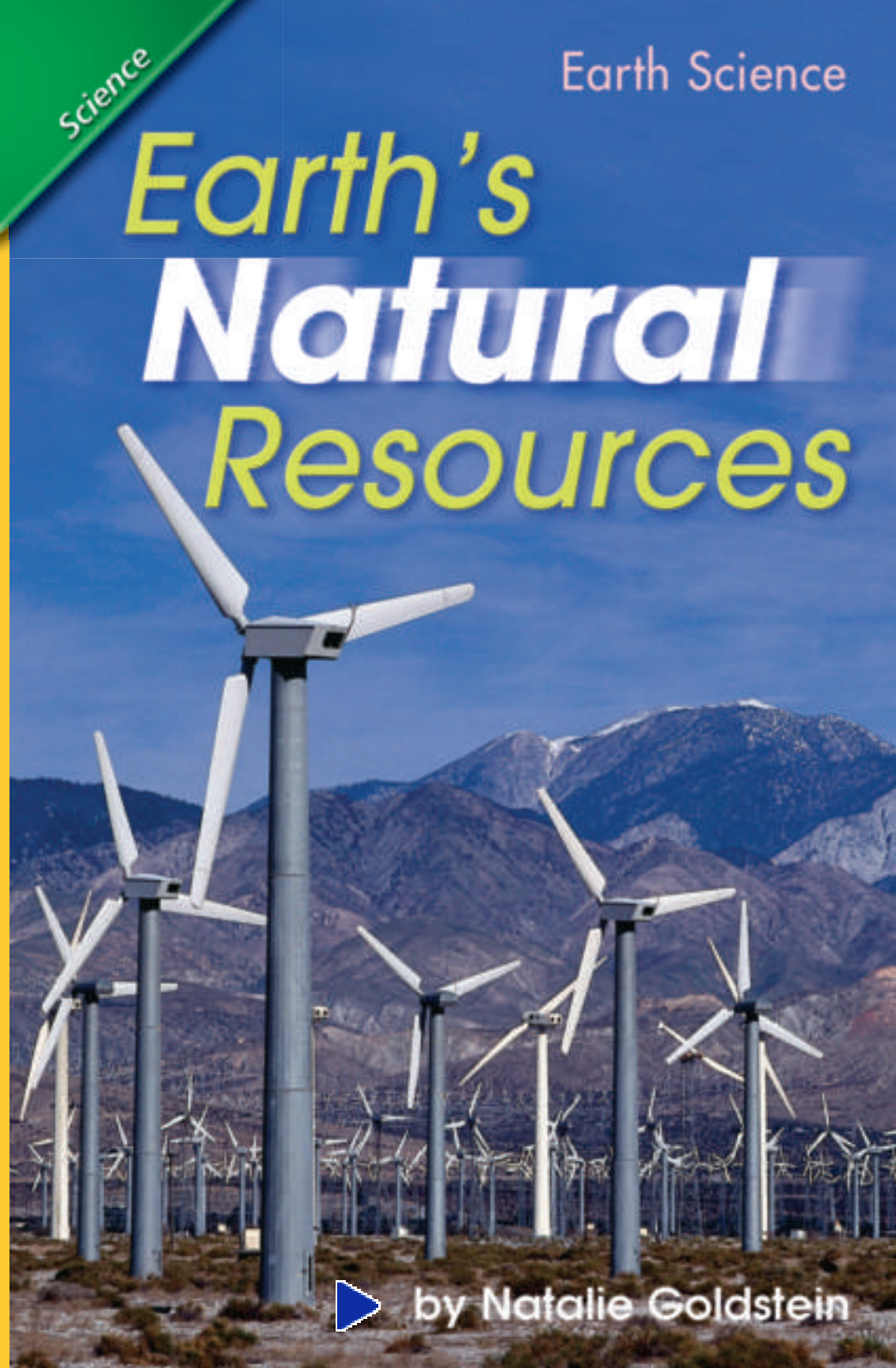
Earth's Natural Resources

Genre	Comprehension Skill	Text Features	Science Content
Nonfiction	Main Idea and Details	<ul style="list-style-type: none"> • Labels • Captions • Diagrams • Glossary 	Protecting Resources

Scott Foresman Science 5.10



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by Natalie Goldstein

Vocabulary

biomass
fossil fuel
geothermal
hydroelectric
nonrenewable resource
renewable resource
resource
solar energy

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Earth's Natural Resources

by Natalie Goldstein





Nonrenewable Energy Resources

Two Types of Resources

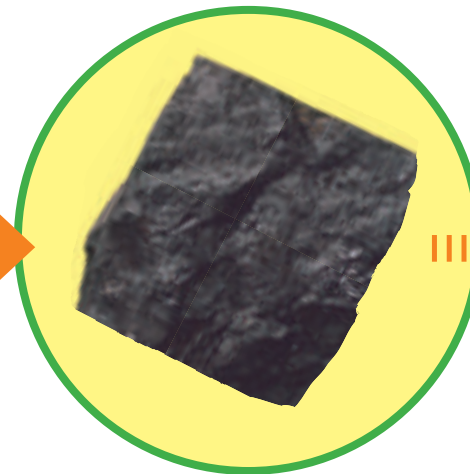
A **resource** is a supply of something that will meet a need for materials or for energy. Earth produces some resources faster than they are used. These are called **renewable resources**. A **nonrenewable resource** cannot be replaced or made as fast as people use it. Sometimes it cannot be replaced at all.



Green plants take in energy from the Sun.



Dead plants form peat.



Peat eventually forms coal.



Burning coal releases energy.



Coal is a nonrenewable resource that takes millions of years to form. It forms when dead plants build up on the bottom of swamps. Layers of dead plants are pressed into a material called peat. Eventually, the peat turns into coal. Coal is an important fuel that people use to generate electricity. The plants that form coal take in energy from the Sun. This energy is stored in the coal and is released when it is burned.

Oil and natural gas are also formed when the remains of organisms are buried and changed. Oil, which is also called petroleum, forms from the remains of tiny sea organisms. Coal, oil, and natural gas are all called **fossil fuels** because they come from the remains of ancient organisms.

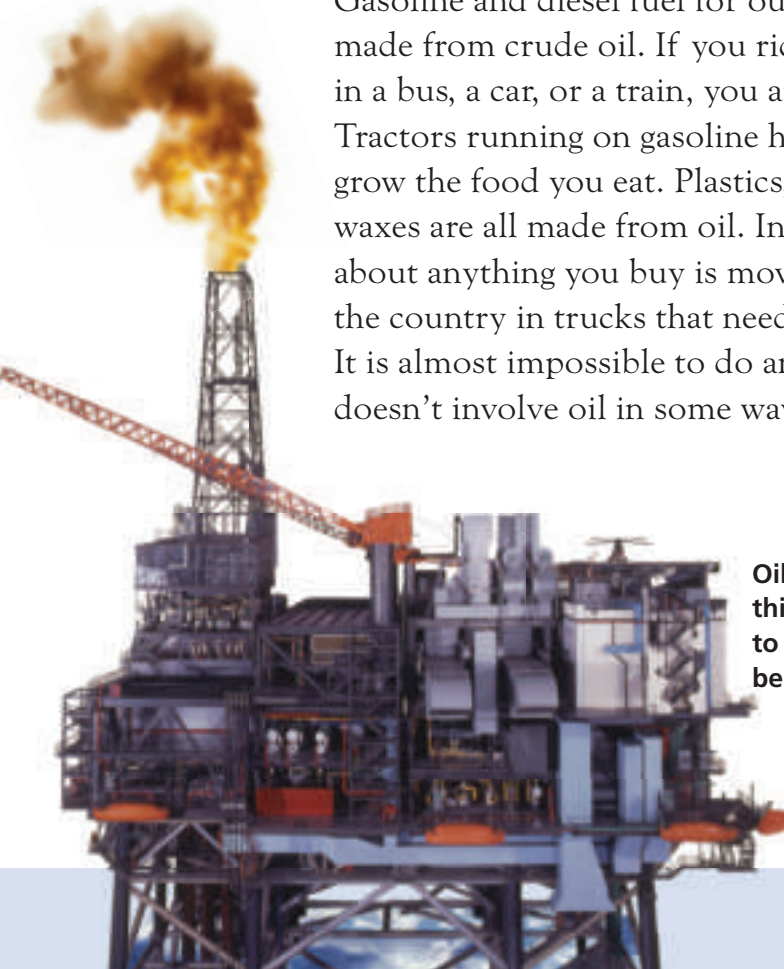




Oil and Natural Gas

Oil and natural gas are buried deep within Earth, beneath land or underwater. Drilling rigs are used to make holes in Earth to reach these resources. When oil or natural gas are beneath the ocean, special rigs such as the one shown below must be used. The rigs are either towers that reach the ocean floor or platforms that float on the surface. Natural gas and oil are often found together. They are both pumped out of the ground and stored in large tanks until they are needed.

Oil is used in just about everything we do. Gasoline and diesel fuel for our vehicles are made from crude oil. If you ride to school in a bus, a car, or a train, you are using oil. Tractors running on gasoline help farmers grow the food you eat. Plastics, greases, and waxes are all made from oil. In fact, just about anything you buy is moved around the country in trucks that need oil to run. It is almost impossible to do anything that doesn't involve oil in some way.




Oil rigs, such as this one, are used to drill for oil beneath the ocean.

Oil spills can be very dangerous to ocean plants and animals.



Advantages and Disadvantages of Fossil Fuels



Fossil fuels have some advantages over other energy sources. For example, coal and oil are easy to store and move from place to place. It is easier to get energy from fossil fuel than from many other energy sources.

But there are many problems with fossil fuels. All fossil fuels are nonrenewable resources. One day we will run out of fossil fuels. Also, burning coal and oil causes a lot of air pollution, which is bad for people, animals, buildings, and plants. Oil spills are a pollution problem too. When ships that carry oil leak or sink, oil spills into the water. This is very dangerous for plants and animals living in the ocean.

People are looking for ways to make the collection, transportation, and use of fossil fuels safer. Better ships are being built that are less likely to spill oil. Cars are being designed to burn less fuel and make less pollution.



Other Energy Resources

Solar Energy

Scientists are trying to develop new energy sources that are renewable and make less pollution. One of the resources people have started using is solar energy. **Solar energy,** the energy in sunlight, is a renewable resource. For as long as the Sun shines on our planet, we will have solar energy.

There are two main ways people use solar energy. One way is to use devices called solar cells that turn sunlight into electricity. Many spacecraft get their electricity from solar cells. Another way is to use sunlight for heating materials. For example, sunlight is used to heat water for homes. Solar energy may be used to heat the space inside a home too.



Advantages and Disadvantages

Solar energy has some great advantages. We will have sunlight for billions of years, so it is a renewable resource. Also, solar energy does not produce pollution.

But there are also some problems with solar energy. For example, it cannot produce power at night or on cloudy days. Solar energy systems are also expensive to make, and the factories that make solar cells can produce pollution.

Solar panels are made up of many solar cells. They make electricity for spacecraft.

solar panel

solar panel

solar panel



Wind Energy

People have used wind energy for thousands of years. The wind was used to turn the blades of windmills. These blades were connected to huge stones inside mills. As the blades turned, the stones turned and ground grain into flour.

Beginning around 1800, small windmills were used on American farms. These windmills were attached to pumps that brought water up from beneath the ground.

Today, new windmills turn the wind's energy into electricity. A modern windmill's blades spin a generator that makes electricity. A gearbox inside the windmill lets the generator spin quickly, so it can still produce electricity even when there isn't much wind. The electricity can be sent through wires to power homes and factories.

Modern windmills are much more efficient than ancient ones.

Advantages and Disadvantages

Wind power has some of the same advantages as solar power. It is renewable. As long as there is weather on Earth, there will be wind. Wind energy does not cause any pollution.

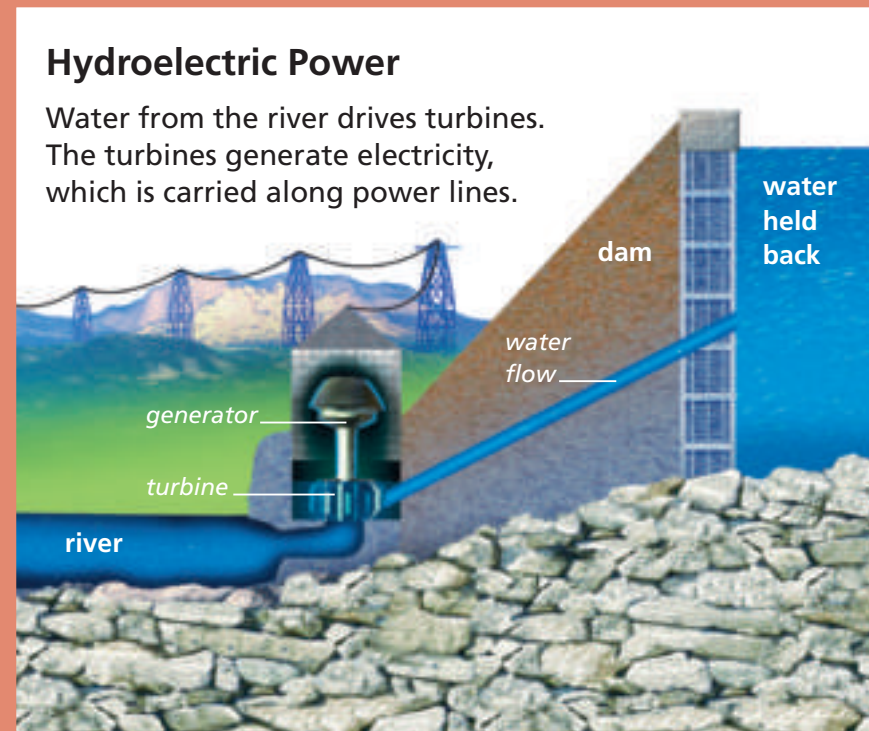
Wind energy also has some of the same disadvantages as solar energy. Wind does not blow all the time. Many places in the world do not have winds that are strong enough to generate energy. Wind power also has some unique problems. Birds are sometimes killed when they fly into the tall windmills or the turning blades. Also, some people think that windmills are noisy and ugly. They do not want windmills near their homes.



Water Energy

Flowing water has been used for hundreds of years to do work for people. For example, factories were built along rivers. The flowing river water turned large paddle wheels. The energy of the moving wheels was used to cut wood, make cloth, or grind grain.

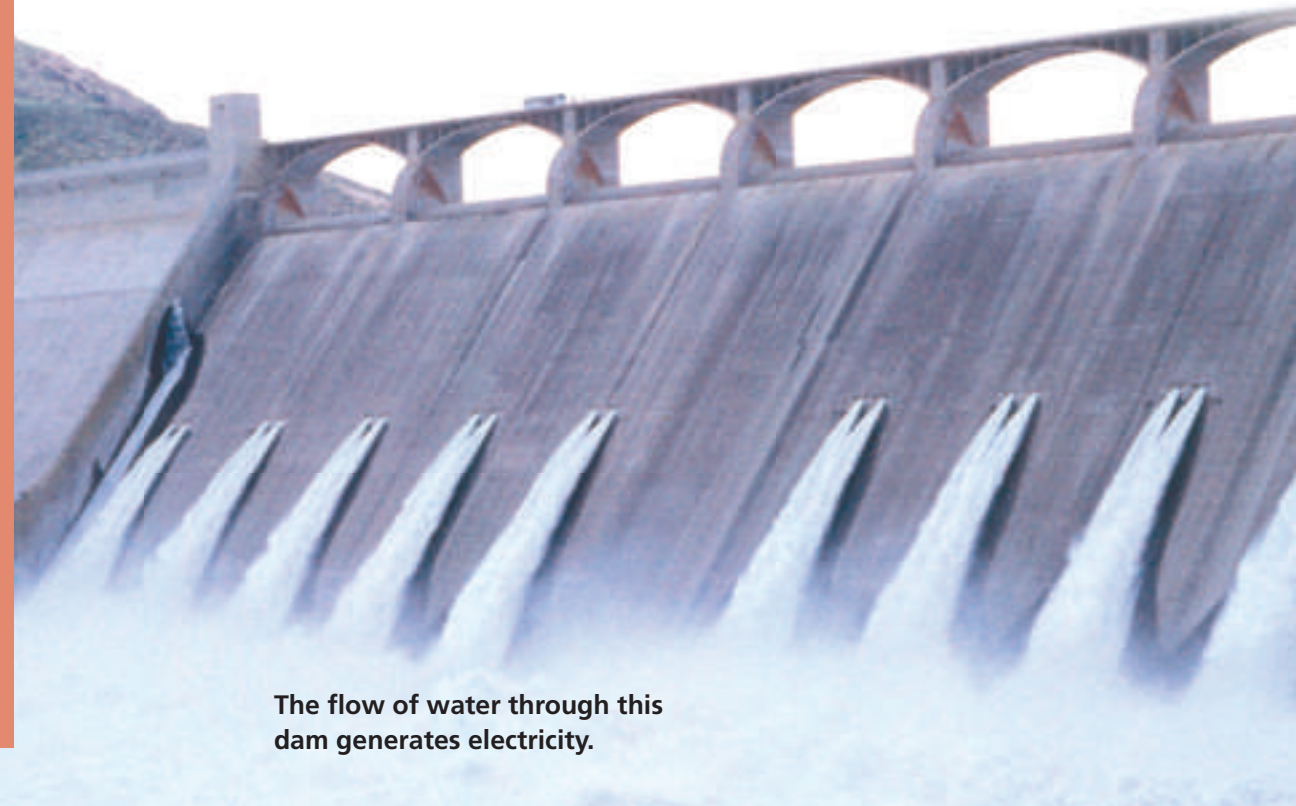
Today, moving water is used to generate electricity. This is called **hydroelectric** power. Hydroelectric power plants are built in dams, which block the normal flow of river water. The flow of water through the dam is controlled. The water flowing through the dam turns parts of large generators in the power plant. As they spin, the generators make electricity.



Advantages and Disadvantages

Hydroelectric power is another renewable source of electricity. As long as a river flows, a power plant in a dam can use the moving water to generate electricity. Another advantage is that it does not produce pollution.

But hydroelectric power has some disadvantages too. Hydroelectric power plants can be built only on large rivers with a lot of flowing water. When a dam is built, the land behind it is flooded. This destroys habitats for plants and animals. It may also destroy people's homes or entire towns. A dam may also harm river fish. Some fish need to swim up the river to lay eggs. The hydroelectric dam often blocks the river. The fish cannot swim past the dam. They cannot lay their eggs upriver, so the fish population may decline.



The flow of water through this dam generates electricity.

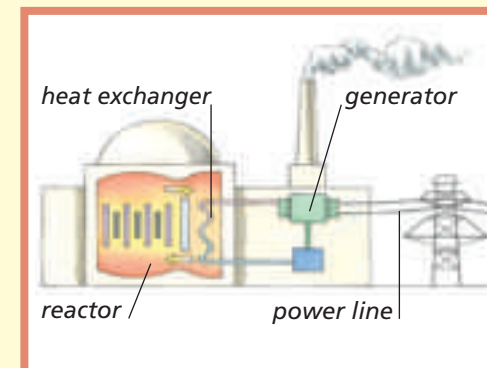
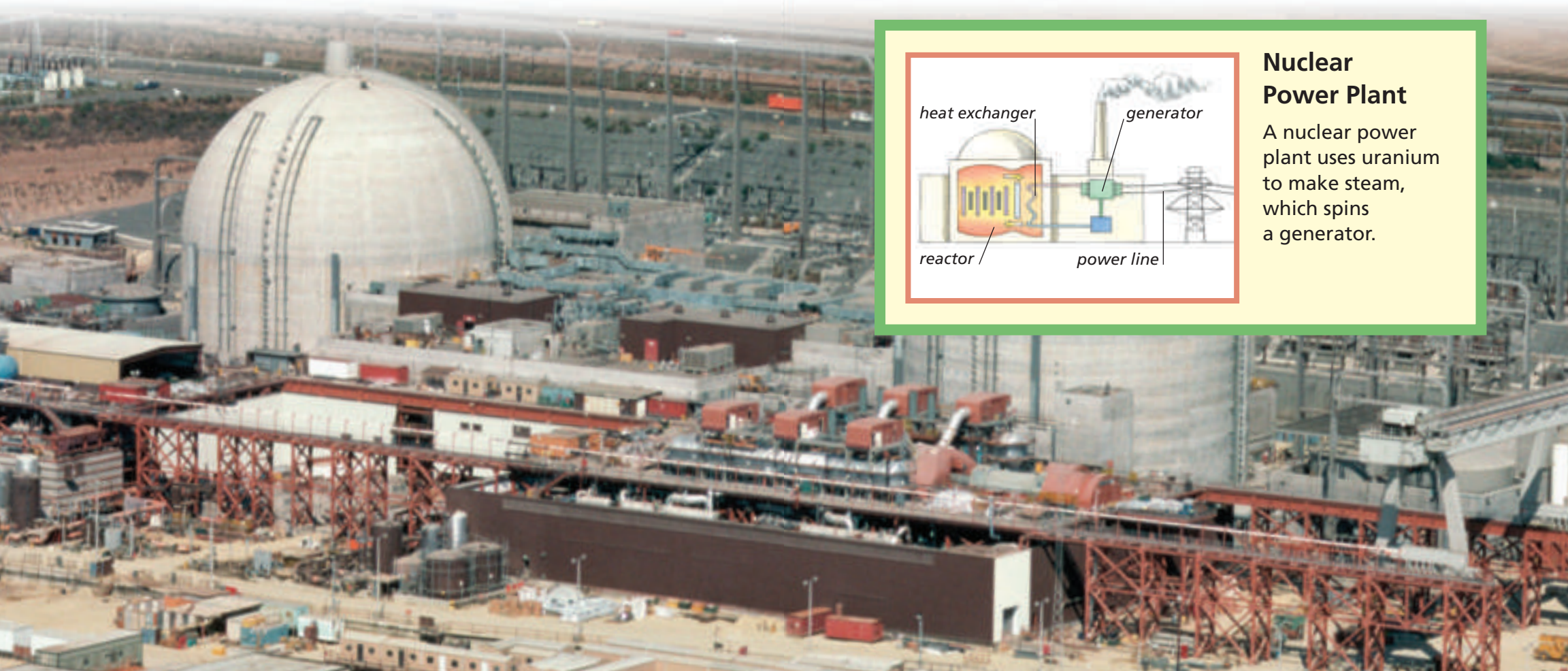


Nuclear Power

In a nuclear power plant, a rare metal called uranium is used to produce electricity. Atoms of uranium are split in a part of the plant called the reactor. This releases huge amounts of heat. The heat is used to make steam that drives generators. This is the same process that a fossil fuel plant uses, except the heat is generated by splitting uranium atoms instead of by the burning of oil or coal.



Nuclear power has some advantages over other power sources. Since so much energy is produced by splitting atoms of uranium, a nuclear plant needs only a tiny amount of fuel. Also, nuclear power produces no air pollution. Yet nuclear power has its disadvantages. Once the uranium has been used, it becomes a very dangerous waste product. This waste is very difficult and expensive to get rid of. Also, building a nuclear power plant is very expensive. Nuclear fuel is a nonrenewable resource. There is a limited amount of uranium on Earth. Someday all of it will be used up.



Nuclear Power Plant

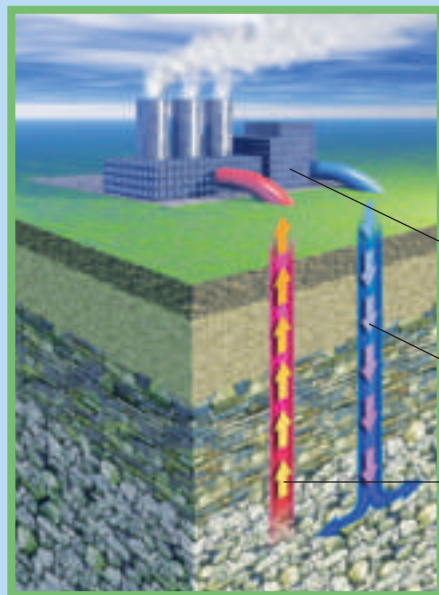
A nuclear power plant uses uranium to make steam, which spins a generator.



Geothermal Energy

Geothermal energy uses the heat inside Earth to generate electricity. This can be done in several ways. One way is to pour water down deep holes into extremely hot rock. There, the water gets very hot and may even boil and turn to steam. The hot water or steam rises to the surface. It enters a power plant where it is used to turn generators that make electricity.

Geothermal energy does not depend on changing weather conditions such as sunlight or wind. Although a few pollutants may be found in geothermal steam, it pollutes much less than fossil fuels. However, geothermal energy can be used only where there are very hot rocks or hot water close to Earth's surface. Places where this happens are not always close to where the power is needed.



Heat into Electricity

Geothermal power plants can be built only where hot rock is close to Earth's surface.

Steam spins generators to make electricity.

Cold water pumped into the ground.

Water heated by hot rocks pumped back to surface.



Biomass Energy

Biomass is any material that was recently alive, including food waste, wood, paper, grasses, and leaves. Biomass can be burned in power plants to produce electricity.

Not all biomass is burned in power plants. Some is used to make fuel for cars and trucks. Chemicals added to some biomass change it into a liquid fuel that can be used like gasoline. Heating the liquid to high temperatures turns it into a gas. This can be used to heat homes in the same way as natural gas.

One of the best sources of biomass is garbage. It is a completely renewable resource because people are always making more garbage. Also, the more garbage we burn, the less we have to put into dumps and landfills. The biggest problem with burning biomass is that it produces air pollution.



Garbage can be used as fuel for a biomass power plant.



Other Types of Resources

Mineral Resources

Fuel for energy is not the only resource we get from Earth. We can also get mineral resources. Minerals are nonliving materials in Earth. Some common mineral resources are iron and salt. More rare minerals include gold, silver, and diamonds.

People use mineral resources in many ways. Gold is used in electronics and for jewelry. Iron is an extremely useful metal that is very common. Iron can be mixed with the element carbon to make steel. Steel is very strong and is used to make cars, tools, tall buildings, and many other useful things.

Gypsum and mica are also useful minerals. Gypsum is a white material that is used to make plaster and paint. Mica is a mineral also used in paint.



gold and
diamonds



Gypsum and mica
are minerals used
in paint.

**Many huge structures
are built out of steel,
which is made from
the mineral iron.**



Mining can be harmful to plant and animal habitats.



Minerals are nonrenewable resources. Earth contains a limited amount of them. Some minerals are much more common than others. Earth has much more iron than other minerals, such as copper, lead, or zinc. Because minerals are nonrenewable, people should use them wisely. Products made of minerals should be reused and recycled to make the minerals last longer.

Minerals are taken out of Earth by mining. Some mines are on the surface. Others are dug deep into the ground. Mining can harm the land. At the location of some mines, trees and plants are removed. The land is dug up and the plants and animals cannot live there any longer.

Mining also causes pollution. Mine dust can cause air pollution. Some minerals must be separated from rock with dangerous chemicals. The chemicals can cause air or water pollution. Often, chemicals and mine waste are kept in open pits or ponds. A storm or mudslide might cause the pit to leak, which would pollute nearby soil and water. Modern mining companies try to limit the harm caused by mining.



Water, Soil, and Air

Water, soil, and air are very important resources. Without them, life could not exist.

In a way, water, air, and soil are renewable resources. Water is recycled through the water cycle. Clean air is renewable because, over time, pollution washes out of it. Soil is very slowly but constantly forming, through the weathering of rocks. However, renewing these resources takes a very long time, so we must use them carefully.



Power plants cause pollution.



Air is necessary for life. Nearly all living things breathe the oxygen in air. Cars, factories, and power plants often pollute the air. Polluted air can harm you. It also harms plants and animals.

Soil gives plants the minerals they need to grow. Animals rely on the plants for food. Soil may be polluted with chemicals. It may be damaged if too many crops are grown on it. Wind and water also erode soil.

All living things need water. Water is used by people for growing crops. Factories need water to make things we use every day. Water is polluted when people dump waste into it. Rain washes air pollution into water, causing chemical pollution that harms plants and animals.



Polluted water harms fish and other animals.



Can resources be conserved?

Repairing Soil, Water, and Air

In Europe during the 1700s, people began doing things in new ways. Machines were used to do work that people used to do. This was called the Industrial Revolution. Since then, the machines people use have caused pollution. Factories, cars, and power plants pollute the air, the water, and the soil.

Scientists have tools that measure the amount of pollution in the air, water, and soil. By measuring how much pollution there is, scientists can make sure that pollution does not get too bad. If there is a lot of pollution, people can clean it up. Measuring tools also help scientists trace pollution to its source.



Conservation Laws

Today, there are many laws that protect natural resources. These conservation laws help people save natural resources by using them wisely. Some laws make factories and power plants control their pollution. Other laws make mining safer for the environment. Laws also set aside beautiful, natural areas for protection. Following the laws is often expensive, but doing this will make the world a better, healthier place to live.

Using Less and Reusing

The best way to conserve natural resources is to use less of them. For example, people can turn down the heat in winter to save electricity. Reusing things is another way of saving resources. This can be as simple as using an old plastic juice bottle as a water bottle, or covering your schoolbooks with the paper bags you used to carry groceries.





Recycling is one of the best-known ways of conserving resources.

Recycling

Do you put your plastic bottles in a different waste container than your regular trash? If so, you're probably recycling. Recycling means to treat a material so it can be used again. Glass can be recycled. It is ground up, melted, and reformed into new products. Plastic is recycled in a similar way. Paper can also be recycled. First it is soaked to make a soft pulp. The pulp is screened, washed, and then pressed into new paper.

There are many reasons to recycle. Recycling saves natural resources. It also saves energy. For example, it takes lots of energy to mine aluminum to make cans. It takes less energy to recycle used aluminum cans to make new cans.



You can help save resources by recycling. Collect paper, aluminum cans, plastic, and glass at school and at home. Find out if your town picks up recycled materials from your house. Or take them to your area's recycling center.

Recycling is just one way you can help conserve resources. Think of all the different types of resources you've read about in this book. Can you think of a way to conserve each of them? By reducing, reusing, and recycling resources, you are helping improve and protect your environment. You are helping Earth's environment too!



Glossary

biomass	any material that was recently alive, such as food waste or paper
fossil fuel	a material used as a fuel that comes from the remains of long-dead organisms
geothermal	using the heat inside Earth to generate electrical power
hydroelectric	using the power of flowing water to generate electricity
nonrenewable resource	a resource that cannot be replaced at all or cannot be replaced as fast as people use it
renewable resource	a resource that can be replaced
resource	something that meets a need for materials or energy
solar energy	energy from sunlight

What did you learn?

1. Why are fossil fuels considered to be nonrenewable resources?
2. What are three kinds of renewable resources that can be used to generate electricity?
3. What is recycling, and how does it help people save natural resources?
4. **Writing in Science** Water, soil, and air are necessary for nearly all living things. Write to explain how these vital resources are sometimes polluted. Include details from the reading to support your answer.
5. **Main Idea and Details** Explain the problems with our heavy use of fossil fuels for energy. Use details from the reading to support your answer.